TOPIC LIST ONE

Chapter 01-03

The following is a list of important topics and objectives for students taking Chemistry 10. Exams and assignments will focus on helping students achieve these objectives. Additional topics may be added during the semester and not all will be tested for on any given exam or assignment. Students are encouraged to use this outline as a baseline for reviewing chapters, preparing for exams, and determining if Chemistry 10 meets the student's personal objectives in studying chemistry.

Knowledge:

- ☐ Define truth, knowledge, justification, and belief.
- ☐ Understand that in science, the knowledge we seek is reproducible, testable, tentative, predictive, and explanatory.
- ☐ Define observation, measurement, and empirical.
- ☐ Understand the roles of observations, hypothesis, experiments and theory in scientific method.
- ☐ Differentiate between a law and theory of science.
- ☐ Differentiate between science and technology.
- ☐ Distinguish basic research from applied research.

Matter:

- ☐ Define chemistry and matter.
- ☐ Differentiate between extensive and intensive properties.
- ☐ Differentiate between the three states of matter by state properties of shape, volume, and compressibility.
- ☐ Explain the properties of states of matter by structure, density, cohesion and energy of particles.
- ☐ Know mixtures have variable composition and properties, that they can be separated by physical processes.
- ☐ Define homogenous, heterogeneous, and phase.
- ☐ Recognize and classify matter by purity and consistency.
- ☐ Distinguish between physical changes and chemical changes (reactions).
- ☐ Differentiate between and give examples of physical and chemical properties of matter.

Measurement

- ☐ Identify the factor and label of a measurement.
- ☐ Describe the relationship between a measurement and it's unit standard.
- ☐ Convert between values in standard and scientific notation.
- ☐ Use scientific notation in algebraic calculations.
- ☐ The standard units on which the SI system is based and their dimension.
- ☐ Know the name, symbol and definition of the SI prefixes giga through femto.

Density

- ☐ Understand the concept of density.
- ☐ Describe the relationship between density, volume, and mass.
- ☐ Apply the technique of measuring by difference to volume, mass, and length.
- ☐ Calculate the density of matter and solve problems using the density equation.

Conversion

- ☐ Given an equivalence construct either of the two possible conversion factors.
- ☐ Use conversion factors to scale units.
- ☐ Use conversion factors to bridge unit systems.
- ☐ Know the bridging equivalence between inches and cm,
- ☐ Know the bridging equivalence between pounds and kilograms.
- ☐ Know the scaling equivalences between seconds, minutes, hours, days and years.
- ☐ Convert between celsius, Kelvin, and fahrenheit temperatures.
- ☐ Know the bridging equivalence between calories and joules.
- ☐ Use dimensional analysis to convert between measurements in different dimensions.

- ☐ Use dimensional analysis to accomplish multistep conversions.

Greek Contribution
- ☐ Explain the atomic theory offered by Democritus.
- ☐ Use atomic theory to explain the properties of state, density and consistency.
- ☐ State the observations that justified the elemental theory offered by Empedocles.
- ☐ Know Aristotle's role in the competition between atomic and elemental theory.

Alchemy
- ☐ Describe how alchemists identified substances that not elements.
- ☐ Differentiate between substances that are elements and compounds.
- ☐ Name the first two modern elements identified by Paracelsus.
- ☐ Explain how Joseph Priestly's experiment demonstrated air is not an element.
- ☐ Understand Antoine Lavoisier's improved definition of elements.
- ☐ State the law of conservation of mass, know it was offered by Antoine Lavoisier.
- ☐ State the law of constant conservation, know it was offered by Joseph Proust.
- ☐ State the law of multiple proportions, know it was offered by John Dalton.
- ☐ State the four parts of John Dalton's atomic theory.

Periodicity
- ☐ Know the name and symbol of the first 18 elements.
- ☐ Understand how chemists determine the relative masses of different elements.
- ☐ State the law of periodicity.
- ☐ Understand how Mendeleev organized the elements into the periodic table.
- ☐ Identify elements as metals, non-metals, or metalloids using a periodic table.
- ☐ Know the name of element families in group 1A, 2A, 6A, 7A, and 8A.
- ☐ Identify representative, transition metal, and inner transition elements.
- ☐ Identify the period, group and family of elements based using a periodic table.

Electricity (Faraday)
- ☐ Describe the properties of electric charge.
- ☐ Understand charged atoms and charged molecules are called ions.
- ☐ Define and distinguish between cations and anions.
- ☐ Describe how Michael Faraday identified and differentiated between cations and anions.

Sub-atomic Paricles (Thomson)
- ☐ Understand how J.J. Thomson’s determined the charge to mass ratio of cathode particles.
- ☐ Describe Millikan’s oil drop experiment and show what it demonstrated.
- ☐ Show how J.J. Thomson demonstrated the existence of the first subatomic particle.
- ☐ Describe Thomson’s Plum-Pudding model of the atom and explain the reasoning behind it.
- ☐ Explain the existence of ions using the Plum-Pudding model.

Parts of the Atom (Rutherford)
- ☐ Understand the differences in charge and mass of alpha, beta, and gamma radiation.
- ☐ Describe Ernest Rutherford’s gold foil experiment and state it’s three most important observations.
- ☐ Explain the three hypothesis Rutherford produced from his gold foil experiment.
- ☐ Understand the nuclear model of the atom and explain it’s basis in Rutherford's observations.
- ☐ Sketch the nuclear model of the atom, and identify its parts.